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Box PATENT APPLICATION
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Sir:

Transmitted herewith for filing is the patent application of inventor(s):

Eric A. Bunn, Nishe Fernando and Llavanya Fernando

For:

A VIRTUAL-PRODUCT PRESENTATION SYSTEM

Enclosed are also:

- ☐ Information Disclosure Statement, PTO 1449 & ___ references
- ☒ 29 sheets of Specification, Abstract and Claims
- ☒ 11 sheets of drawings. Formal ___, Informal X
- ☐ An Assignment of the invention to: _____
(cost of recording to be charged to Deposit Account No. 06-1300 (Order No. /))
- ☐ Power of Attorney by Assignee
- ☐ Combined Declaration and Power of Attorney for Patent Application
- ☒ Declaration for Patent Application (**UNSIGNED**)
- ☐ Associate Power of Attorney
- ☒ Small Entity Status Declaration Under 37 CFR 1.9(f) and 1.27(b) (**SIGNED**)

	(Col. 1) NO. FILED	(Col. 2) NO. EXTRA	SMALL ENTITY		OTHER THAN SMALL ENTITY	
			RATE	FEE	RATE	FEE
BASIC FEE			\$	345	\$	690
TOTAL CLAIMS	11 - 20 =	0	x 9 =	\$ 0	x 18 =	\$
INDEP CLAIMS	4 - 3 =	1	x 39 =	\$ 39	x 78 =	\$
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If the difference in Col 1 is less than zero, enter "0" in Col. 2			TOTAL	\$ 384	TOTAL	\$ 0

- ☒ Our check No. 30971 in the amount of \$384.00 to cover the filing fee is enclosed.
- ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, including extension fees, or credit any overpayment to Deposit Account No. 06-1300 (our Order No. A-68295/MAK/LM).

Respectfully submitted,

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For: A VIRTUAL-PRODUCT PRESENTATION SYSTEM

VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY STATUS
(37 CFR 1.9(f) and 1.27(c)) - SMALL BUSINESS CONCERN

I hereby declare that I am

- ☐ the owner of the small business concern identified below:
☒ an official of the small business concern empowered to act on behalf of the concern identified below:

NAME OF SMALL BUSINESS CONCERN: OPUS.COM, INC.
ADDRESS OF SMALL BUSINESS CONCERN: 3051 N. 1st Street
San Jose, California 95134

I hereby declare that the above identified small business concern qualifies as a small business concern as defined in 13 CFR 121.12, and reproduced in 37 CFR 1.9(d), for purposes of paying reduced fees to the United States Patent and Trademark Office, United States Code, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both.

I hereby declare that rights under contract or law have been conveyed to and remain with the small business concern identified above with regard to the invention entitled A VIRTUAL-PRODUCT PRESENTATION SYSTEM described in

- ☒ the specification filed herewith
☐ application serial no. _____, filed _____
☐ patent no. _____, issued _____

If the rights held by the above identified small business concern are not exclusive, each individual, concern or organization having rights in the invention is listed below* and no rights to the invention are held by any person, other than the inventor, who would not qualify as an independent inventor under 37 CFR 1.9(c) if that person made the invention, or by any concern which would not qualify as a small business concern under 37 CFR 1.9(d), or a nonprofit organization under 37 CFR 1.9(e).

* NOTE: Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27)

FULL NAME _____
ADDRESS _____
☐ Individual ☐ Small Business Concern ☐ Nonprofit Organization

FULL NAME _____
ADDRESS _____
☐ Individual ☐ Small Business Concern ☐ Nonprofit Organization

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b)).
I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

NAME OF PERSON SIGNING Gary Bummelhoff
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PATENT APPLICATION

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A VIRTUAL-PRODUCT PRESENTATION SYSTEM

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The shopper's satisfaction with such a shopping experience depends on a number of factors: the ease of finding the correct department or area, the ease of finding the correct sub-department or sub-area, the breadth and depth of the merchant's products on display, 5 the extent to which the merchant's products on display correctly represent the merchant's stock on hand, the availability of information about particular instances of the merchant's products on display, etc. The salesperson, whose presence is not an unmitigated blessing, can also affect the shopper's shopping experience. Each of the following 10 salesperson attributes can affect the customer's satisfaction: availability, memory for detail, expertise, truthfulness, etc.

These factors and attributes are each described briefly below: Some merchants' stores have many departments, spread out over multiple floors or over areas as large as one square city block – or 15 both. Without the aid of a greeter and even with the aid of a store directory, a shopper can feel overwhelmed at the prospect of searching such a vast space for the right department or area.

Even having located the right department or area, the shopper may still have to wander an entire floor, several long aisles, many short 20 aisles or a minor maze of display cases.

One way to limit these initial searches is to limit the number of different products in the store. However, shoppers like selection and tend to reward merchants with the greater breadth and/or depth. In response, the merchant increases his displays. Nonetheless, 25 the space available to a merchant is not unlimited, and its choice of products to display must also be limited, regardless of the shoppers' desire for more.

A shopper can be extremely frustrated when he has gone through the bother of locating the right department and sub-department 30 and of selecting the right product from the multiple examples on display, only then to learn that the selected product is not in stock.

Accordingly, some importance lies in offering for sale only products

which can be sold, that is, which are in stock. At the least, a shopper should be told before he invests time in inspecting a product that that product is not in stock.

5 A stumbling block on the road to a shopper's walking out with a purchase is providing that shopper with enough information to make him confident enough to buy. Where a shopper is interested in, say, the dot pitch of a laptop screen but the marketing literature on display for the product does not include information about the dot pitch, the shopper's desire to buy that product expectedly wanes.

10 One way to improve the information available to a shopper is to enlist the aide of a salesperson. People, and in particular, good, well informed salespeople, are very adept at presenting the particular information a shopper wants in order to spur the buying of a product. The first hurdle to fully realizing a sales staff is the "Never a
15 Salesperson Around When You Need One" concept. A shopper can get information from a well informed salesperson only if the salesperson is actually available. Further, a well informed salesperson has a limit to the amount of product detail he can retain and recall on demand. Computer-screen dot pitch, for example, is a feature about which the
20 digerati would ask but about which the typical shopper would not even know.

Indeed, in some cases, a shopper is faced with a salesperson who appears to know less about the product of interest than the shopper does. Let alone knowing product details on the boundary between
25 informative and esoteric, a salesperson can fail to be an expert at all.

Where a shopper's inquiries bottom out on the (lack of) depth of the salesperson's knowledge, the salesperson is faced with conflicting interests. Does he maintain his integrity, admit his lack of knowledge and possibly lose the sale or does he manufacture answers to the
30 shopper's questions, independent of the truth, and persevere to close the sale? The latter option may be successful in the short term, but when the shopper tests his newly purchased product against the salesperson's

promises, the merchant can expect a dissatisfied shopper returning the product and demanding a refund.

Salesperson or no, sometimes a product is considered too expensive or fragile for a shopper to experience hands on before
5 purchase.

Accordingly, a new method of presenting a product for sale to a shopper is desirable where:

- a shopper does not have to invest time or energy in determining the right department and sub-department or area and sub-area,
- 10 • the merchant can display an essentially unlimited number of types of products and examples of product types,
- a merchant does not present for sale an item which the merchant does not have in stock or, at least, informs a shopper early in the shopping experience that the item is not in stock,
- 15 • a merchant can present to the shopper all marketing and technical information about the product and/or
- marketing and official technical information about any product is always available to the shopper.

DalmerChrysler Corp. of Detroit, Michigan has manufactured a
20 kiosk for displaying products. **Figure 1** is a sketch of this kiosk **100** according to the prior art. The kiosk **100** includes a touch screen **120**, a cathode-ray tube display **110**, a speaker system **130** and a printer **140**. A housing **150** holds the components of the kiosk **100** together.

The speaker system **130** is stereophonic but with low-quality
25 speakers.

In operation, a user approaches the kiosk **100** and, following directions on its display **110**, uses the touch screen **120** to navigate its menu system to locate a product of interest. The kiosk **100** displays a limited-animation or non-animated sequence of pictures of the product –
30 or even a single, static picture of the product. The audio information that the kiosk **100** offers is voice and/or music only.

Accordingly, an improved product presentation system is desirable where:

- the visual display of the product is dynamic and/or
- the display of the product includes sensory information other than product appearance and human voice.

Indeed, in its fullest expression, such a product presentation system would include all sensory aspects of the product such that having the actual product present would be redundant. The product as presented is virtually real.

These and other goals of the invention will be readily apparent to one of ordinary skill in the art on reading the background above and the description below.

SUMMARY

Herein are described apparatus and methods for virtually presenting a product for purchase by a consumer. The product has one of the following characteristics: vibrations, a mass, a texture, a smell, and a temperature. A memory stores a representation of a characteristic of the product. The representation is retrieved on demand from a shopper, and the characteristic reproduced from the retrieved representation for the benefit of the shopper. At the appropriate point — say, after the shopper's buying the product — the retrieval of the product for the shopper may be initiated.

The storage of the characteristic representation may involve storage in a database accessible over an internet.

The apparatus may include a memory storing a representation of a characteristic of the product for purchase. The characteristic is from a set of characteristics including vibrations, a mass, a texture, a smell and a temperature. The apparatus may also include a simulation sub-system communicatively coupled to the memory and corresponding to the characteristic. That is to say, the sub-system is from a set of simulation sub-systems including a vibratory sub-system for simulating

vibrations, a mass-simulation sub-system for simulating mass characteristics, a textural sub-system for simulating a texture, an olfactory sub-system for simulating a smell and a temperature-simulation sub-system for simulating a temperature. Finally, the apparatus may also
5 include a sales sub-system for indicating a desire to purchase the product.

The memory may store a second representation of a second characteristics of the product for purchase, the second characteristic from the same set of characteristics. Then the apparatus also includes a
10 second sub-system corresponding to the second characteristic, the second sub-system from also the same set of simulation sub-systems and also communicatively coupled to the memory.

The sales sub-system may be a purchase sub-system for purchasing the product.

15 An internet may couple the memory and the simulation sub-system.

In another embodiment, the apparatus for virtually presenting a product for purchase may include a memory storing three representations of a respective three characteristics of a product for purchase, the
20 respective three characteristics from a characteristics set including an image, a sound, vibrations, a mass, a texture, a smell and a temperature. The apparatus may also include three sub-systems corresponding to the three characteristics. That is to say, the three sub-systems are from a set of simulation sub-systems including a visual sub-system for
25 simulating images, an auditory sub-system for simulating sounds, a vibratory sub-system for simulating vibrations, a mass-simulation sub-system for simulating a mass, a textural sub-system for simulating a texture, an olfactory sub-system for simulating a smell and a temperature-simulation sub-system for simulating a temperature. The
30 three simulation sub-systems are communicatively coupled to the memory.

The memory may store a fourth representation of a fourth characteristic of the product for purchase, the fourth characteristic

from the same characteristics set. Then the apparatus also includes a fourth sub-system corresponding to the fourth characteristic, the fourth sub-system also from the same set of simulation sub-systems and also communicatively coupled to the memory.

5 An internet may couple the memory and the three simulation sub-systems.

In yet another embodiment, the apparatus for virtually presenting products for purchase may include the memory containing the three representations of a respective three characteristics of a product
10 for purchase, the three sub-systems corresponding to the three characteristics (still communicatively coupled to the memory), an internet coupling the memory and the three simulation sub-systems and the purchase sub-system for purchasing the product.

15 BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a sketch of a kiosk according to the prior art.

Figure 2 is a diagram illustrating a virtual-product presentation system according to one embodiment of the invention.

Figure 3 illustrates one embodiment of the visual sub-system.

20 Figure 4 illustrates one embodiment of the auditory sub-system.

Figure 5 illustrates one embodiment of the vibratory sub-system 230.

25 Figure 6 illustrates one embodiment of the mass-simulation sub-system 240.

Figures 7A and 7B illustrate one embodiment of the textural sub-system 250. Figure 7A illustrates a cross-sectional view of the sub-system 250 while Figure 7B illustrates an external view of the same.

30 Figure 8 illustrates one embodiment of the olfactory sub-system 260.

Figure 9 illustrates one embodiment of the temperature-simulation sub-system 270.

Figures 10 and 11 illustrate two alternate embodiments of the visual sub-system.

Figures 12 and 13 illustrate alternate embodiments of the mass-simulation sub-system. Figure 13 is a side-on view of a rod-in-mass configuration composing the sub-system.

Figure 14 illustrates an alternative embodiment of the textural sub-system.

Figure 15 illustrates a database accessible over a network via the communications interface.

Figure 16 is a top-down view of the rod-in-mass configuration of Figure 13.

The drawings are not to scale.

DESCRIPTION OF THE INVENTION

15 DEVICES

- A Virtual-Product Presentation System

Figure 2 illustrates a virtual-product presentation system 200 according to one embodiment of the invention. The virtual-product presentation system (VPPS) 200 may include a central processing unit (CPU) 290, memory 2A0, a communications interface 2B0, a visual sub-system 210 for simulating images, an auditory sub-system 220 for simulating sounds, a vibratory sub-system 230 for simulating a vibrations, a mass-simulation sub-system 240 for simulating one or more characteristics of a mass (center of gravity, inertia, weight, etc.), a textural sub-system 250 for simulating a texture, an olfactory sub-system 260 for simulating a smell, a temperature-simulation sub-system 270 for simulating a temperature, a communications bus 2C0 and a housing 280 (not shown).

The housing 280 physically relates the sub-systems 210, 220, 230, 240, 250, 260, 270 to each other. The communications bus 2C0 communicatively couples each of the visual, auditory, vibratory, mass-

simulation, textural, olfactory, temperature-simulation and communications sub-systems 210, 220, 230, 240, 250, 260, 270, 2B0 to the CPU 290 and to the memory 2A0, as well as couples the CPU 290 and memory 2A0 to each other.

5 The memory 2A0 includes high-speed, volatile random-access memory (RAM) 2A2, as well as non-volatile memory such as read-only memory (ROM) 2A1 and magnetic disk drives. Further, the memory 2A0 contains software 2A3. The software 2A3 is layered: Application software 2A31 communicates with the operating system 2A32, and the operating system
10 2A32 communicates with the I/O subsystem 2A33. The I/O subsystem 2A33 communicates with the sub-systems 210, 220, 230, 240, 250, 260, 270 and the communications interface 2B0 by means of the communications bus 2C0.

 Figure 3 illustrates one embodiment of the visual sub-system 210. In Figure 3, the visual sub-system 210 includes an optical-image
15 projector 211, a mirror 212, a dome 213, and a screen 215. The projector, mirror, dome and screen 211, 212, 213, 215 are optically coupled.

 The optical-image projector 211 of the visual subsystem 210 may be a motion-picture projector, a cathode ray tube (CRT), a liquid
20 crystal display (LCD) or the like.

 The dome 213 defines a physical space for the projected image and helps the illusion that a physical object is inside. The visual sub-system 210 may include an optional background 214. This background 214 blocks out background distractions and creates the illusion that the
25 image is an object inside the dome 213.

 The screen 215 is a light-reflecting, non-mirror surface. The screens used in motion-picture or slide projection are examples. Additionally, the screen 215 may have fade-away edges and a color matching the background 214, both in order to avoid sharp contrast with
30 the background 214. (In one embodiment, this color is black.)

 Figure 4 illustrates one embodiment of the auditory sub-system 220. In Figure 4, the sub-system 220 includes high-quality

stereophonic speakers 221, a signal processor 222 and a communications bus 223. The bus 223 may be fully or partially integral with the communications bus 200.

5 The signal processor 222 includes a digital-to-analog (D/A) converter.

In Figure 4, the sub-system 220 includes stereophonic speakers, although a monophonic presentation is possible, as is an N-channel presentation, where $N > 2$. For example, six-channel speaker systems are commonly used to re-create a movie-theater experience outside
10 of such a theater.

Also, the speakers 221 are described as high quality. Lower-quality speakers are, of course, possible (but would limit the representation of certain products – top-quality speakers, for example).

Figure 5 illustrates one embodiment of the vibratory sub-
15 system 230. In Figure 5, the vibratory sub-system 230 includes a rest, mold or mount 231, actuation system 232, and a cable 233 or other means for communicatively connecting the actuation system 232 and the rest 231. The rest 231 may be a joystick, a grip ring, a hand mold or other means for transmitting vibrations to a hand in physical contact with the mount
20 231. The bus 200 connects to the actuation system 232 to permit external control of the sub-system 230.

The sub-system 230 optionally includes other rests or mounts 234 for transmitting vibrations to (an)other part(s) of the human body, including a rest for a second hand, a seat for buttocks or a rest for a
25 foot. Indeed, the rest 231 itself need not be for a hand but may be for another body part as well.

The mass-simulation sub-system 240 simulates characteristics of a mass in a gravity field (typically, Earth's gravity field at sea level). Simulated characteristics may include center of gravity, inertia
30 and weight.

Figure 6 illustrates one embodiment of the mass-simulation sub-system 240. In Figure 6, the mass-simulation sub-system 240 includes

a handle(s) 241, a magnetic mass 243, a magnetic-field generator 244 and a cable 245. The cable 245 mechanically couples the handle(s) 241 to the magnetic mass 243. The magnetic mass 243 is itself coupleable magnetically to the magnetic-field generator 244. The bus 2C0 connects
5 to the generator 244 to permit external control of the sub-system 230.

(As used herein, the phrase "magnetic mass" refers to a collection of matter capable of being attracted by a magnet.)

Figures 7A and 7B illustrate one embodiment of the textural sub-system 250. Figure 7A illustrates a cross-sectional view of the sub-system 250 while Figure 7B illustrates an external view of the same. The
10 sub-system 250 may include a belt 251, multiple texture samples 252, a rotor 253, the housing 280, an opening 281 and the bus 2C0 (not shown). The multiple samples 252 are attached or integral to the belt 251, the belt itself mechanically coupled to the rotor 253. The housing 280
15 substantially covers the samples 252 except for an opening 281 exposing a single sample 252. The bus 2C0 connects to the rotor 253 to permit external control of the textural sub-system 250.

Figure 7B illustrates a top view of the sub-system 250.

Not shown in Figures 7A and 7B are optional hydraulic,
20 pneumatic or the like pads supporting corresponding samples 252 (from the shopper's perspective). A supporting pad may vary the pressure with which it supports its sample 252 to more accurately represent the texture to be simulated.

Figure 8 illustrates one embodiment of the olfactory sub-system 260. The olfactory sub-system 260 may include multiple non-specific olfaction sample containers 261, respective multiple non-specific olfaction samples 266, respective multiple channels 267, a mixer
25 262, an expresser 263 and the bus 2C0.

The expresser 263 is mechanically coupled to the sample
30 containers 261 and the mixer 262. The samples 266 reside in respective containers 261 that connect to respective channels 267. The channels 267 also connect to the mixer 262. The mixer 262 includes an exit 268. The

bus 200 connects to the expresser 263, permitting external control of the sub-system 260.

In operation, the bus 200 carries a signal to the expresser 263 to express a particular smell. The expresser 263 expresses some
5 combination of quantities of the samples 266 from the containers 261 into the channels 267. The sample quantities travel along the channels 267 into the mixer 262.

The mixer 262 mixes the sample quantities, and the expresser 263 expresses the resulting mixed sample through the exit 268 in the
10 expected general direction of a shopper. (The mixer 262 or the expressor 263 may atomize the mixed sample.)

In one embodiment, the non-specific olfaction samples 266 span all or a signification portion of the space of human olfaction. (In a preferred embodiment, where the human sense of smell can be said to
15 separate any given olfactory input into N (not necessarily orthogonal) characteristics, then the sub-system 260 includes N non-specific olfaction samples 266 corresponding respectively to those N characteristics.)

The reference Firms Are On Scent of New Technology: Internet
20 Odors, Taste, Wall Street Journal, May 1, 2000, at C25A, surveys scent technology. Such scent technologies are alternate embodiments of the olfaction sub-system 260. (The Wall Street Journal reference is incorporated herein by reference.)

Figure 9 illustrates one embodiment of the temperature-
25 simulation sub-system 270. The sub-system 270 includes a heating element 271, a cable 272, a thermostat 273 and the bus 200. The heating element 271 may radiate, conduct, convect or otherwise impart its heat to the intended target. The cable 272 communicatively couples the thermostat 273 and the heating element 271. The bus 200 connects to the thermostat
30 273, permitting external control of the sub-system 270.

Again regarding the VPPS system 220 of Figure 2, the communications interface 2B0 may include a controller 2B1 for accessing a

communications link 2D0. At least one database 2E0 of product information is accessible via the link 2D0. Figure 15 illustrates the database 2E0 accessible over a network 2D0 via the communications interface 2B0.

5 For example, the storage requirements for multi-angle, high-resolution, three-dimensional images of a single product are notoriously high. Multiplying that storage requirement by hundreds or thousands of different products makes the storage requirements even more onerous.

 By farming the storage requirements out to a database
10 available over the communications link 2D0 (here, say, the internet), the invention allows multiple sites across the world to share the same database of images. This reduces to almost the point of elimination the local storage requirements for the kind of data stored in the internet database. Further, the economies of scale reduce the cost of maintaining
15 the database over the communications link 2D0. Indeed, the database may reduce any product's representation to basic shapes that can be modified to represent the product with minimal cues from the database to the VPPS 200.

 The communications sub-system 2B0 may also include devices
20 for communicating with the shopper. For example, in some embodiments, the sub-system 2B0 includes some or all of the following devices common in computer systems: a monitor 2B2, a keyboard 2B3, a mouse 2B4, a touchscreen 2B5 overlying an LCD 2B6, a pen 2B7, a trackball 2B8.

 The system 200 may include a point-of-sale (POS) sub-system
25 2F0 (not shown).

 Figures 10 and 11 illustrate two alternate embodiments of the visual sub-system 210. In Figure 10, the sub-system 210 includes the projector 211, the screen 215 and the dome 213. The projector, mirror and dome are still optically coupled but in a different configuration.
30 Here, the projector 211 is horizontal (that is to say, parallel to the ground). A photon generated by the projector 211 travels vertically upward into the dome 213 and reflects off of the screen 215 into the line

of sight of a viewer. A color-matched background 214 is positioned behind the screen 215.

In Figure 11, the sub-system 210 includes the projector 211, the mirror 212, the dome 213 and the screen 215. The projector, mirror and dome are still optically coupled but in yet a different configuration. Here, the projector 211 is angled to project an image from behind and near the bottom or below the dome 213 onto the mirror 212 located above and closer to the dome 213. The mirror 212 is angled to reflect that image down onto the screen 215. The image reflects off of the screen 215 into the line of sight of a viewer.

An advantage of the embodiment of Figure 11 is that the sub-system 210 requires less space vertically than the embodiments of Figures 3 and 11.

A format converter 224 is optional in the auditory sub-system 220. The sub-system 220 may also include a CPU 225 and memory 226 that allows the sub-system to operate initially under the direction of the kiosk CPU 290 but subsequently independently of that CPU 290.

One embodiment of the mass-simulation system 240 is a magnetic levitation-based haptic system reportedly under development at Carnegie Mellon University, Pittsburgh, PA. The following articles describe that Carnegie Mellon haptic system: "Simulating Touch," Popular Science, June 1999, at 39; P.J. Berkelman and R.L. Hollis, "Interaction with Simulated Environments using a Magnetic Levitation Haptic Interface Device," IEEE International Conference on Robotics and Automation Video Proceedings, May 10-15, 1999 (a video) ("Berkelman I"); and P.J. Berkelman, R.L. Hollis, and D. Baraff, "Interaction with a Realtime Dynamic Environment Simulation using a Magnetic Levitation Haptic Interface Device," IEEE International Conference on Robotics and Automation, May 10-15, 1999, pp. 3261-3266 ("Berkelman II"). "Simulating Touch," Berkelman I and Berkelman II are incorporated by reference herein.

Figures 12 and 13 illustrate alternate embodiments of the mass-simulation sub-system 240. In Figure 12, an optional pulley system 242 changes the direction of movement of the handle(s) 241 (indicated with solid, double-headed arrows) with respect to that of the magnetic mass 243 (indicated with blank double-headed arrows).

Figure 13 is a side-on view of a rod-in-mass configuration composing the sub-system 240. The rod-in-mass configuration includes one or more handles 241, an actuator 246 including multiple rods 247, respective multiple masses 249 and a cable 245. The bus 200 attaches to the actuator 206 to allow external control of the sub-system 240.

The cable 245 connects the handles 241 to the actuator 246. Each of the rods 247 is capable of moving in order to connect or disconnect a respective mass 249 to the actuator 246. The actuator 246 moves the rods 247.

The rods 247 and the actuator 246 together effect a tunable mass 243. For example, if the maximum weight to be simulated is forty-eight (48) pounds, then the rods 247 weigh 1 pound, 2 pounds, 4 pounds, 8 pounds, 16 pounds and 32 pounds. With this combination of weighted rods, the sub-system 240 can simulate 1 through 48 pounds (actually, through 63 pounds) in 1-pound increments.

More generally, where the maximum desired weight to be simulated is N, then the rods 247 are of weights 1, 2, . . . , 2^M , where M is the \log_2 of N, rounded up to the next highest integer, if not an integer. Where a granularity other than one pound is desired, then the maximum desired weight is converted into units of the desired granularity, and the above process applied.

Figure 16 is a top-down view of the rod-in-mass configuration of Figure 13. In this view, optional races or runs 248 stabilize the configuration shown.

Where the multiple masses 249 are magnetic masses, then a mass-simulation sub-system 240 combining properties of the embodiments of Figures 6 and 13 is possible. For example, a sub-system 240 can use the

masses 249 to approximate the mass to be simulated, while the field generator 244 tunes the mass approximation.

Figure 14 illustrates an alternative embodiment of the textural sub-system 250. As in Figure 7A, the sub-system 250 includes the belt 251, multiple samples 252, housing 280 and opening 281. The sub-system 250 also includes the rotor 253 – which may be differently configured to support this embodiment. The sub-system 250 also includes the rest, actuation circuitry and cable 231, 232, 233 of the vibratory sub-system 230. This embodiment combines the textural and mass-simulation sub-systems 250, 230.

In Figure 8, the olfactory sub-system 260 optionally includes specific-source containers 264. Specific source containers 264 contain examples of specific, olfactorily complex products 26D that a shopper may wish to smell. Typically, these products 26D are so complex that the non-specific-source containers 261 would have difficulty reproducing them.

The sub-system 260 also optionally includes a de-expresser 265 for increasing the rate at which an expressed smell dissipates. In one embodiment, the de-expresser 265 is a fan. In another embodiment, the de-expresser 265 includes an air pulser 26A, a sampler 26, optional valves 26B and a feedback signal 26C. The pulser 26A and the sampler 269 connect to the mixer 262.

In operation, the pulser 26A pushes air through the mixer 262 in order to blow any residual mixed samples from the mixer 262. The sampler 269 samples the air exiting the mixer 262 to determine concentrations of the samples 261 in the air. The feedback signal communicates these determined concentrations to the pulser 26A (which may be a part of the expresser 263) that then determines whether the concentrations are sufficiently low to stop the pushed air. The optional valves 26B prevent any sample remaining in a channel 267 from contaminating the mixer 262 after the pulser 26A has cleaned it.

PROTOCOLS

The operation of the sub-systems of the VPPS 200 and of the VPPS 200 itself in one embodiment is further described below. The
5 operation of the subsystems and the VPPS 200 with alternate embodiments will be evident to one of ordinary skill in the art:

The VPPS 200 initially presents a greeting and/or instructional screen on its LCD 2B6 instructing a shopper how to make the VPPS aware of his presence. Such a greeting screen(s) could, for
10 example, include the phrases, "Hello! Please touch this screen to begin."

In response to a shopper's touching the screen 2B5, the VPPS 200 may present one or more additional greeting, instructional and/or advertisement screens.

15 The VPPS 200 presently presents on the LCD 2B6 a top-down series of menus for choosing departments, sub-departments and other lower-level departmental divisions as appropriate and instructs the shopper how to choose and/or invites the shopper to choose. (Herein, the concept of instructing a shopper how to do something means instructing
20 the shopper how to do that thing and/or inviting the shopper to do that thing.)

In response to the shopper's indicating the departmental area of interest, the VPPS 200 presently lists the product categories available in that departmental area and instructs the shopper how to
25 choose.

In response to the shopper's indicating the product category of interest, the VPPS 200 presently asks the shopper whether he wishes to browse or look at a specific known product.

In response to the shopper's indicating that he wishes to
30 browse, the VPPS 200 may present browsing options. For example, the VPPS 200 may list two or more of the following or similar options: browse-all,

browse-by-brand, browse-by-weight, browse-by-cost, and browse-by-color. The VPPS 200 can present a "browse-by-" option for each characteristic in its database of the product category.

In response to the shopper's indicating that he wishes to
5 browse all of the product category, the VPPS 200 presently presents an abbreviated simulation of a first product from the category, followed by an abbreviated simulation of a next product, followed by another and so on. The abbreviated simulations may be still images, one per product.

In a preferred embodiment, while or after presenting an
10 abbreviated simulation, the VPPS 200 instructs the shopper to select the next product. In response to the shopper's indicating his desire to move onto the next product, the VPPS 200 terminates the simulation and presents an abbreviated simulation of a next product – whether or not the abbreviated simulation has run its course. This is done until the
15 category is exhausted.

In addition to instructing the shopper to select the next product to browse, the VPPS 200 instructs the shopper to indicate when he wishes to see a fuller simulation of the product currently but abbreviatedly simulated. In response to the shopper's indicating his
20 wish to see a particular product more fully simulated, the VPPS 200 retrieves the characteristics of the selected product from a database (the database 2E0, for example) and activates the sub-systems 210 through 270 as indicated by the characteristic values retrieved.

The other browsing options are handled in a similar manner.
25 (The ordering of the product presentation within a characteristic category may be a matter of marketing.)

In response to the shopper's indicating that he wishes to see a specific, known product, the VPPS 200 instructs the shopper to enter information sufficient to identify the product, typically the brand and
30 model. After receiving and verifying the data entered, the VPPS 200 retrieves the characteristics of the identified product from a database

and activates the sub-systems 210 through 270 as indicated by the characteristic values retrieved.

Where one of the selected or indicated product's characteristics is visual, the visual-characteristic value includes
5 information sufficient to operate the visual sub-system 210. Accordingly, the CPU 290 drives the bus 2C0, instructing the projector 211 to emit one or more images (that the mirror and screen 212, 215 reflect) into the shopper's eye. These images approximate an image of the product. ("Approximation" includes exact reproduction.)

10 The projector may project multiple, discrete images. In a preferred embodiment, the images are three-dimensional reproductions of the product, two successive images are sufficiently similar and close together as to replicate the product's turning smoothly and continuously in space, and the shopper controls the viewpoint. To allow the user to
15 control the viewpoint, the VPPS 200 coordinates the output the visual sub-system 210 and input from the user from, say, the trackball 2B8 of the communications sub-system 2B0, a handle 241 of the mass-simulation sub-system 240 or a mass-sensitive rim of the sub-system 240.

Where one of the selected or indicated product's
20 characteristics is auditory, the auditory-characteristic value includes information sufficient to operate the auditory sub-system 220. Accordingly, the CPU 290 drives the bus 2C0, instructing the signal processor 222 to emit one or more sounds that the speakers 221 broadcast into the shopper's ears. These sounds approximate the sounds of the
25 product.

Where one of the selected or indicated product's characteristics is vibratory, the vibratory-characteristic value includes information sufficient to operate the vibratory sub-system 230. Accordingly, the CPU 290 drives the bus 2C0, instructing the actuation
30 circuitry 232 to vibrate a rest 231, 234 to approximate the vibrations of the product.

Where the sound of a product varies according to its vibrations, the VPPS 200 may coordinate the operation of the auditory and vibratory sub-systems 220, 230.

Where one of the selected or indicated product's characteristics is mass, the mass-characteristic value includes information sufficient to operate the mass-simulation sub-system 240. Accordingly, the CPU 290 drives the bus 2C0, in one embodiment instructing the generator 244 to generate an electromagnetic field that acts (in concert with the earth's gravitational field) on the mass 243 approximately as does the earth's gravitational field on the product.

Where one of the selected or indicated product's characteristics is textural, the textural-characteristic value includes information sufficient to operate the textural sub-system 250. Accordingly, the CPU 290 drives the bus 2C0, in one embodiment instructing the rotor 253 to turn the belt 251 to bring the appropriate sample 252 approximating a texture of the product to the opening 281 and to appropriately adjust back pressure.

Where one of the selected or indicated product's characteristics is olfactory, the olfactory-characteristic value includes information sufficient to operate the olfactory sub-system 260. Accordingly, the CPU 290 drives the bus 2C0, in one embodiment instructing the expresser 263 to express a certain amount (possibly none) of each of the samples 266, 26D (into the mixer 262) for ultimate expression via exit 268 towards the shopper. The combination of the certain amounts of all of the samples 266, 26D approximate a smell of the product.

Finally, where one of the selected or indicated product's characteristics is temperature, the temperature-characteristic value includes information sufficient to operate the temperature-simulation sub-system 270. Accordingly, the CPU 290 drives the bus 2C0, instructing the thermostat 273 to drive the heating unit 271 to temperatures approximating temperatures associated with the product.

While or after presenting a simulation of a product, the VPPS 200 instructs the shopper how to purchase the product.

Of course, some of the above steps may be collapsed, making the VPPS 200 presentation less logical but more user friendly.

5 Also, the VPPS 200 incorporates "pause," "go back" and "start over" options, as well as reasonable timeouts to account, for example, for the shopper walking away in mid-presentation.

The VPPS 200 coordinates simulations presentations through the sub-systems 210 through 270 as appropriate. Indeed, where particular
10 sub-systems are not needed in the simulation of a product, the VPPS 200 may nonetheless use them to create ancillary sensations of the product, including ancillary sensations of the experience of using the product. For example, where the VPPS 200 is demonstrating the vibrations transmitted through a racket when hit in its sweet spot by a ball, the
15 auditory sub-system 220 can present the sound of the ball hitting that sweet spot.

EXAMPLE

With the VPPS 200 in place, an example shopping experience
20 can be more like the following: The shopper walks into a merchant's store and up to the VPPS 200. (The store may be a major department store such as Macy's or Sears.) In response to a greeting screen, the shopper touches the touchscreen to proceed.

Seeing a menu of departments, the shopper selects the
25 department of the store he wants to start shopping in. Now, rather than proceeding to that department to narrow the search area for the desired product, the shopper further uses the touchscreen 2B5 and LCD 2B6 to walk the lower-level menus presented by the VPPS 200. Let's say the shopper is interested in kitchenwares, more specifically, kitchen appliances.

Having communicated to the VPPS 200 the correct department and sub-department, the shopper next selects the product category of interest. Let's say it is hand-held mixers.

Given the choice to browse or go directly to a known product, the shopper elects to browse, and when given more options, elects to browse by cost. The shopper then sees an image of a first hand-held mixer, along with some product information, including cost. Since this first hand-held mixer is clearly not what he wants, the shopper touches the next-product button. The shopper moves through several mixers in such a manner until he sees one in particular that he likes. This VPPS selection process simulates the shopper's picking up first one product sample and then another, attempting to find the one that best fits his criteria.

Touching the fuller-simulation button, the shopper sees the previously still image of the mixer begin to turn, giving him a full three-dimensional picture of what the mixer looks like. He also hears a voice explaining how he can experience the quietness (that is to say, hear the noise level) of the mixer at different speeds by touching the desired mixer speed button on the touchscreen. The voice also informs him that he can feel how little the mixer vibrates and how strong the torque is by gripping a handle.

The shopper selects a mixing speed, grips the handle and listens to the audio output. He acquires a much fuller sense of the mixer product than he would from just selecting from boxes on shelves or even from seeing samples side-by-side on a shelf.

As a sales aide, the VPPS 200 deploys the otherwise unused olfactory sub-system 260 to express, say, the aroma of baking bread or cookies.

Unclear whether the mixer's controls are easy-to-understand, the shopper uses the handle to turn the image to display the controls and instructs the VPPS 200 to pause and zoom the image. He thus gets a closer look at the controls.

Fairly convinced that this mixer is good, the shopper pulls on the handle to test the weight of the product. More convinced but still not firmly so, he touches a button for more product information. He reviews the store and manufacturer's sales and marketing information, as well as the specifications for the product. He is now firmly convinced.

The shopper inserts his payment card (credit, EFT, smart, etc.) into the point-of-sale terminal in the VPPS 200 and purchases the product. Receiving a receipt from the VPPS 200 and having been informed that delivery of the mixer to the shopper (that is to say, while he is at the VPPS 200) takes a minute or two, the shopper waits at the VPPS 200. He may possibly be distracted by store advertisements or other information from the VPPS 200 or may begin to use the VPPS 200 to shop for another product.

A sales agent or stock person delivers the mixer to the shopper.

Of course, a salesperson may offer his services to the shopper, particularly with respect to criteria which are not readily obvious on initial inspection.

The invention now being fully described, many changes and modifications that can be made thereto without departing from the spirit or scope of the appended claims will be apparent to one of ordinary skill in the art. The use of two mirrors rather than a combination of a mirror 212 and a screen 215 in the visual sub-systems of Figures 3 and 11 is still another example.

WHAT IS CLAIMED IS:

1 1. An apparatus for virtually presenting a product for
2 purchase, said apparatus comprising:
3 a memory containing a representation of an approximation of a
4 characteristic of a product for purchase, said characteristic from
5 a set of characteristics including: vibrations, a mass, a texture,
6 a smell, and a temperature;
7 a sub-system corresponding to said characteristic, said sub-
8 system from a set of simulation sub-systems including:
9 a vibratory sub-system for simulating vibrations;
10 a mass-simulation sub-system for simulating mass
11 characteristics;
12 a textural sub-system for simulating a texture;
13 an olfactory sub-system for simulating a smell;
14 a temperature-simulation sub-system for
15 simulating a temperature,
16 said sub-system communicatively coupled to said memory; and
17 a sales sub-system for indicating a desire to purchase said
18 product.

1 2. The apparatus of claim 1,
2 wherein said memory further comprises
3 a memory containing a second representation of an
4 approximation of a second characteristics of said product for
5 purchase, said second characteristic from said set of
6 characteristics, and
7 wherein said apparatus further comprises
8 a second sub-system corresponding to said second
9 characteristic, said second sub-system from said set of simulation
10 sub-systems and communicatively coupled to said memory.

1 3. The apparatus of claim 1, wherein said sales sub-system
2 comprises
3 a purchase sub-system for purchasing said product.

1 4. The apparatus of claim 1, further comprising
2 an internet, coupling said memory and said simulation sub-
3 system.

1 5. An apparatus for virtually presenting a product for
2 purchase, said apparatus comprising:
3 a memory containing three representations of approximations
4 of a respective three characteristics of a product for purchase,
5 said respective three characteristics from a characteristics set
6 including: an image, a sound, vibrations, a mass, a texture, a
7 smell, and a temperature; and
8 three sub-systems corresponding to said three
9 characteristics, said three sub-systems from a set of simulation
10 sub-systems including:
11 a visual sub-system for simulating images;
12 an auditory sub-system for simulating sounds;
13 a vibratory sub-system for simulating vibrations;
14 a mass-simulation sub-system for simulating mass
15 characteristics;
16 a textural sub-system for simulating a texture;
17 an olfactory sub-system for simulating a smell;
18 a temperature-simulation sub-system for
19 simulating a temperature, and
20 said three simulation sub-systems communicatively coupled to said
21 memory.

1 6. The apparatus of claim 5,
2 wherein said memory further comprises
3 a memory containing a fourth representation of an
4 approximation of a fourth characteristic of said product for
5 purchase, said fourth characteristic from said characteristics set,
6 and
7 wherein said apparatus further comprises
8 a fourth sub-system corresponding to said fourth
9 characteristic, said fourth sub-system from said set of simulation
10 sub-systems and communicatively coupled to said memory.

1 7. The apparatus of claim 5, further comprising
2 an internet, coupling said memory and said three simulation
3 sub-systems.

1 8. An apparatus for virtually presenting products for
2 purchase, said apparatus comprising:
3 a memory containing three representations of approximations
4 of a respective three characteristics of a product for purchase,
5 said respective three characteristics from a characteristics set
6 including: an image, a sound, vibrations, a mass, a texture, a
7 smell, and a temperature;
8 three sub-systems corresponding to said three
9 characteristics, said three sub-systems from a set of simulation
10 sub-systems including:
11 a visual sub-system for simulating images;
12 an auditory sub-system for simulating sounds;
13 a vibratory sub-system for simulating vibrations;
14 a mass-simulation sub-system for simulating mass
15 characteristics;
16 a textural sub-system for simulating a texture;

17 an olfactory sub-system for simulating a smell;
18 a temperature-simulation sub-system for
19 simulating a temperature, and
20 said three simulation sub-systems communicatively coupled to said
21 memory;
22 an internet, coupling said memory and said three simulation
23 sub-systems; and
24 a purchase sub-system for purchasing said product.

1 9. A method for selling a product, said method comprising:
2 storing in a computer memory a representation of an
3 approximation of a characteristic of a product for purchase, said
4 characteristic from a set of characteristics including: vibrations,
5 a mass, a texture, a smell, and a temperature;
6 then retrieving said representation on demand from a shopper;
7 reproducing said characteristic from said retrieved
8 representation for the benefit of said shopper.

1 10. The method of claim 9, further comprising the step of
2 initiating the retrieval of said product for said shopper.

1 11. The method of claim 9, wherein said step of storing
2 comprises
3 storing said representation of an approximation of a
4 characteristic of said product in a database accessible over an
5 internet.

A VIRTUAL-PRODUCT PRESENTATION SYSTEM

5

ABSTRACT OF THE DISCLOSURE

Apparatus and methods for virtually presenting a product for purchase by a consumer. The product has one of the following characteristics: vibrations, a mass, a texture, a smell and a temperature. A memory stores a representation of a characteristic of the product. The representation is retrieved on demand from a shopper, and the characteristic reproduced from the retrieved representation for the benefit of the shopper. At the appropriate point — say, after the shopper's buying the product — the retrieval of the product for the shopper may be initiated. The storing of the characteristic representation may involve storing the representation in a database accessible over an internet. The apparatus may include a memory containing a representation of an approximation of a characteristic of the product for purchase, the characteristic from a set of characteristics including vibrations, a mass, a texture, a smell, and a temperature. The apparatus may also include a simulation sub-system communicatively coupled to the memory and corresponding to the characteristic. That is to say, the sub-system is from a set of simulation sub-systems including a vibratory sub-system for simulating vibrations, a mass-simulation sub-system for simulating mass characteristics, a textural sub-system for simulating a texture, an olfactory sub-system for simulating a smell and a temperature-simulation sub-system for simulating a temperature. Finally, the apparatus may also include a sales sub-system for indicating a desire to purchase the product.

30

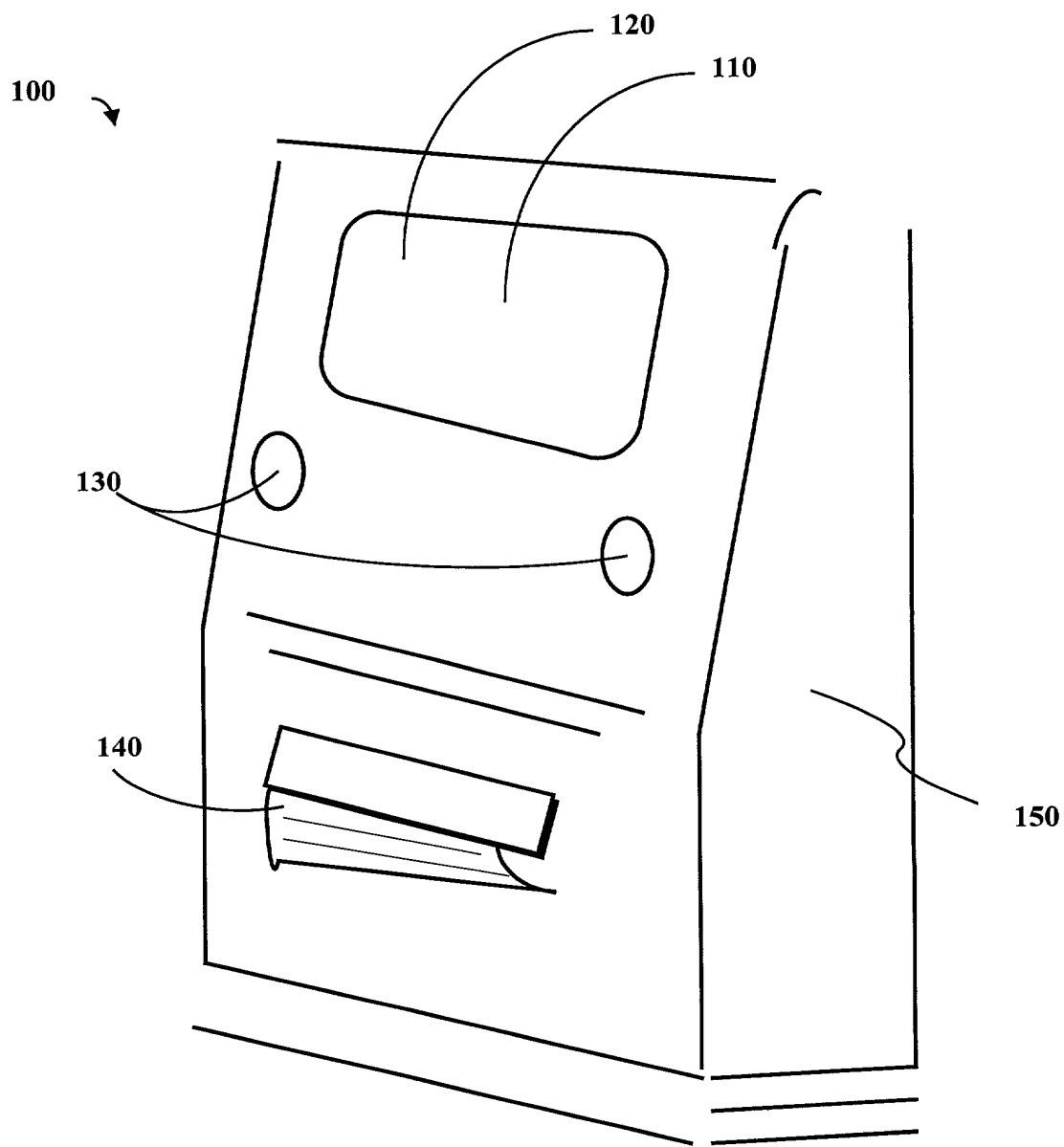


Figure 1
(Prior Art)

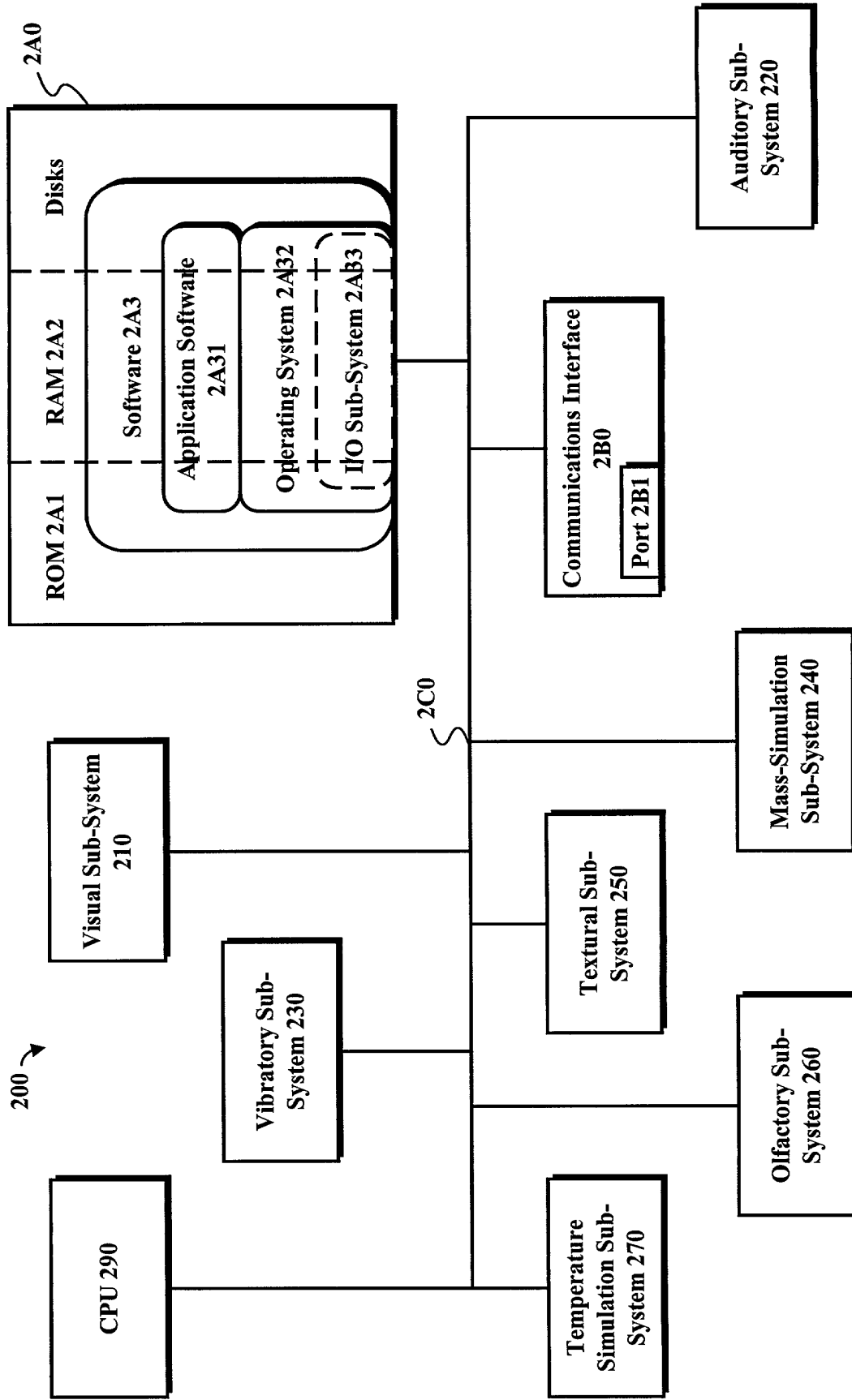


Figure 2

Parameter	Estimate	Standard Error	z-Statistic	p-Value	95% Confidence Interval
Intercept	1.0000	0.0000			
Age	0.0000	0.0000			
Age squared	0.0000	0.0000			
Age cubed	0.0000	0.0000			
Age quartic	0.0000	0.0000			
Age quintic	0.0000	0.0000			
Age sextic	0.0000	0.0000			
Age septic	0.0000	0.0000			
Age octic	0.0000	0.0000			
Age nonic	0.0000	0.0000			
Age decic	0.0000	0.0000			
Age undecic	0.0000	0.0000			
Age duodecic	0.0000	0.0000			
Age tredecic	0.0000	0.0000			
Age quattuordecic	0.0000	0.0000			
Age quindecic	0.0000	0.0000			
Age sexdecic	0.0000	0.0000			
Age septendecic	0.0000	0.0000			
Age octodecic	0.0000	0.0000			
Age novemdecic	0.0000	0.0000			
Age vigintic	0.0000	0.0000			
Age unguic	0.0000	0.0000			
Age sexagesim	0.0000	0.0000			
Age sexagesim squared	0.0000	0.0000			
Age sexagesim cubed	0.0000	0.0000			
Age sexagesim quartic	0.0000	0.0000			
Age sexagesim quintic	0.0000	0.0000			
Age sexagesim sextic	0.0000	0.0000			
Age sexagesim septic	0.0000	0.0000			
Age sexagesim octic	0.0000	0.0000			
Age sexagesim nonic	0.0000	0.0000			
Age sexagesim decic	0.0000	0.0000			
Age sexagesim undecic	0.0000	0.0000			
Age sexagesim duodecic	0.0000	0.0000			
Age sexagesim tredecic	0.0000	0.0000			
Age sexagesim quattuordecic	0.0000	0.0000			
Age sexagesim quindecic	0.0000	0.0000			
Age sexagesim sexdecic	0.0000	0.0000			
Age sexagesim septendecic	0.0000	0.0000			
Age sexagesim octodecic	0.0000	0.0000			
Age sexagesim novemdecic	0.0000	0.0000			
Age sexagesim vigintic	0.0000	0.0000			
Age sexagesim unguic	0.0000	0.0000			
Age sexagesim sexagesim	0.0000	0.0000			
Age sexagesim sexagesim squared	0.0000	0.0000			
Age sexagesim sexagesim cubed	0.0000	0.0000			
Age sexagesim sexagesim quartic	0.0000	0.0000			
Age sexagesim sexagesim quintic	0.0000	0.0000			
Age sexagesim sexagesim sextic	0.0000	0.0000			
Age sexagesim sexagesim septic	0.0000	0.0000			
Age sexagesim sexagesim octic	0.0000	0.0000			
Age sexagesim sexagesim nonic	0.0000	0.0000			
Age sexagesim sexagesim decic	0.0000	0.0000			
Age sexagesim sexagesim undecic	0.0000	0.0000			
Age sexagesim sexagesim duodecic	0.0000	0.0000			
Age sexagesim sexagesim tredecic	0.0000	0.0000			
Age sexagesim sexagesim quattuordecic	0.0000	0.0000			
Age sexagesim sexagesim quindecic	0.0000	0.0000			
Age sexagesim sexagesim sexdecic	0.0000	0.0000			
Age sexagesim sexagesim septendecic	0.0000	0.0000			
Age sexagesim sexagesim octodecic	0.0000	0.0000			
Age sexagesim sexagesim novemdecic	0.0000	0.0000			
Age sexagesim sexagesim vigintic	0.0000	0.0000			
Age sexagesim sexagesim unguic	0.0000	0.0000			
Age sexagesim sexagesim sexagesim	0.0000	0.0000			
Age sexagesim sexagesim sexagesim squared	0.0000	0.0000			
Age sexagesim sexagesim sexagesim cubed	0.0000	0.0000			
Age sexagesim sexagesim sexagesim quartic	0.0000	0.0000			
Age sexagesim sexagesim sexagesim quintic					

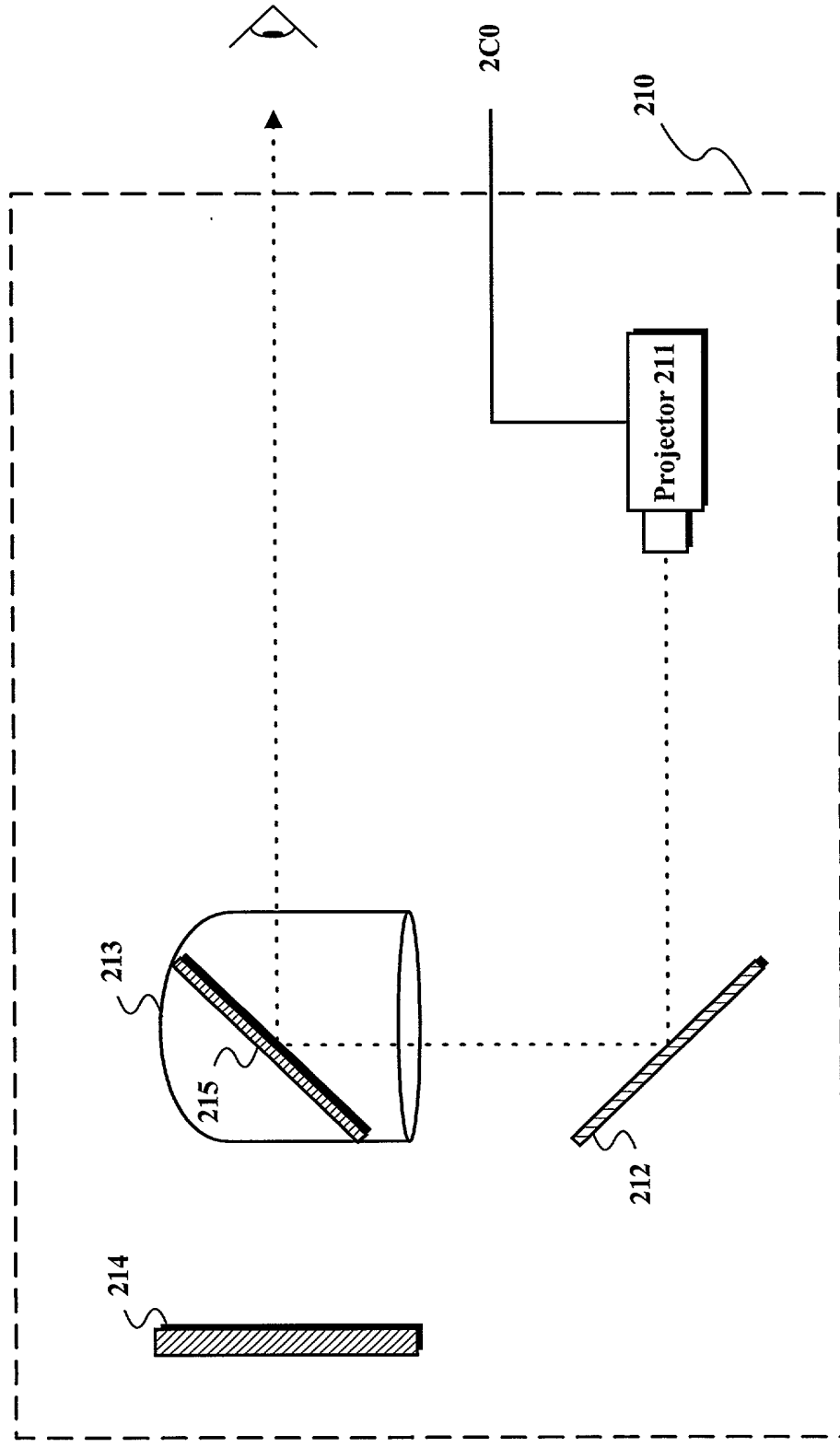


Figure 3

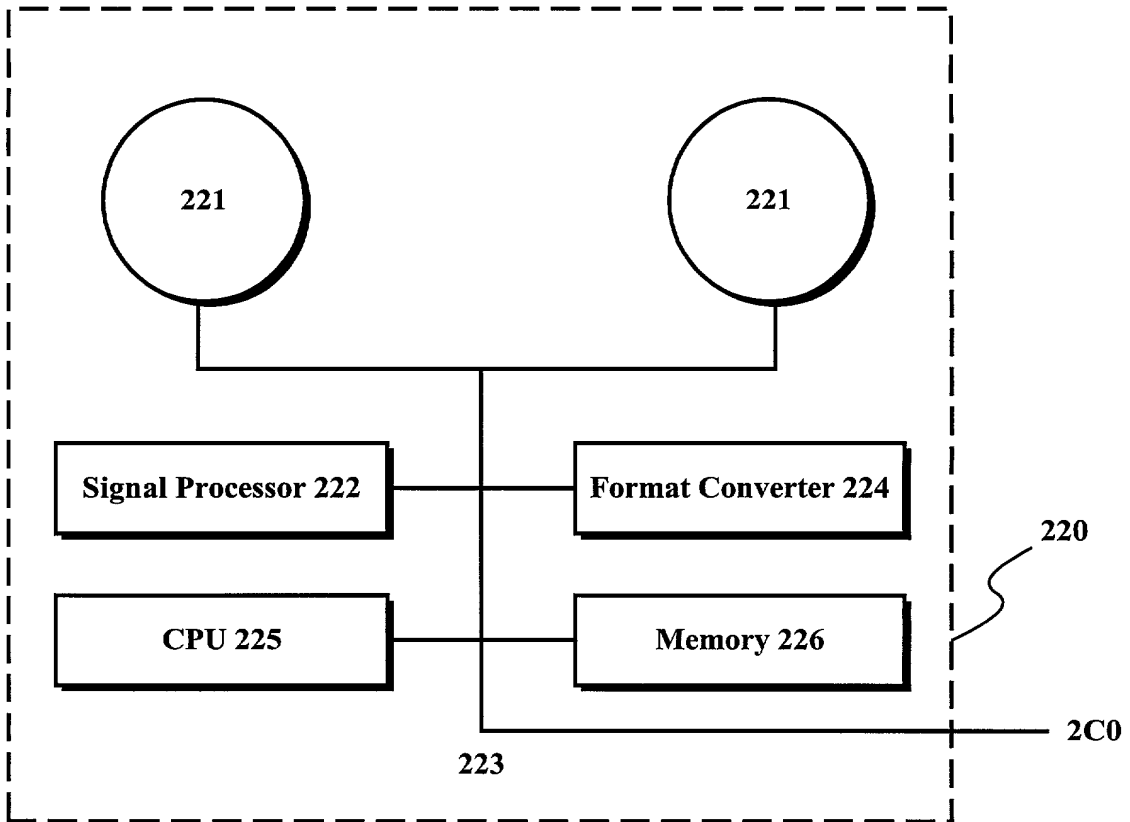


Figure 4

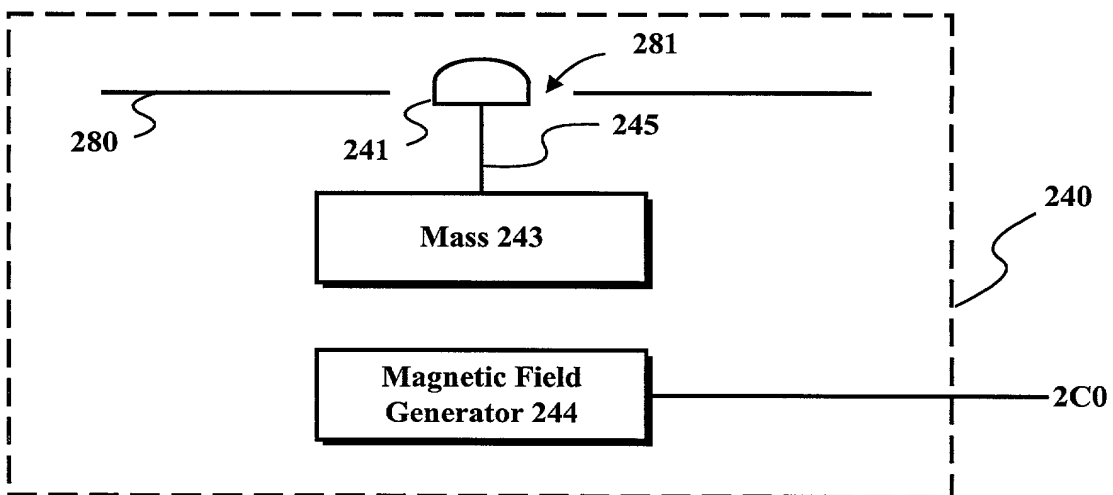


Figure 6

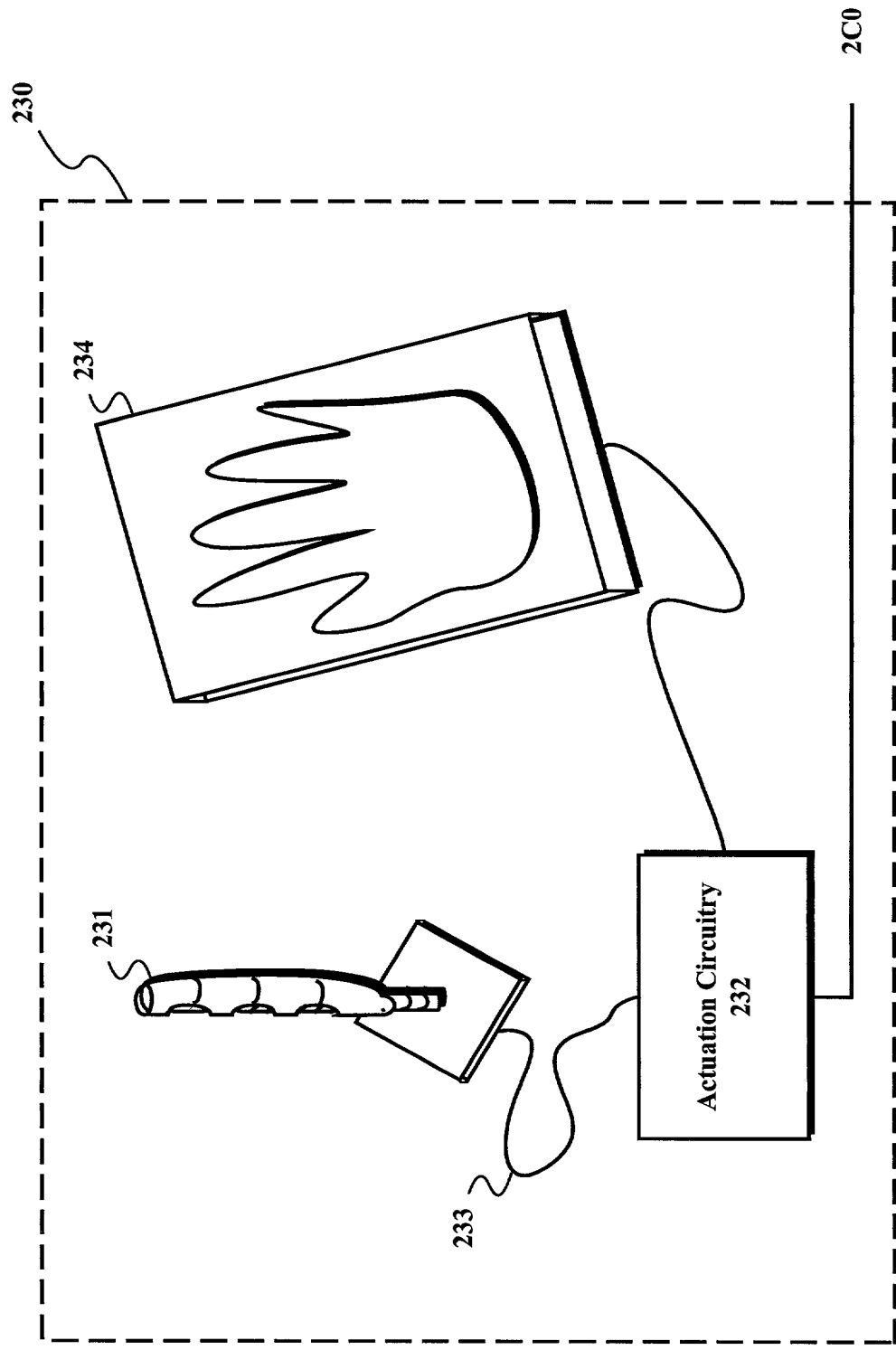


Figure 5

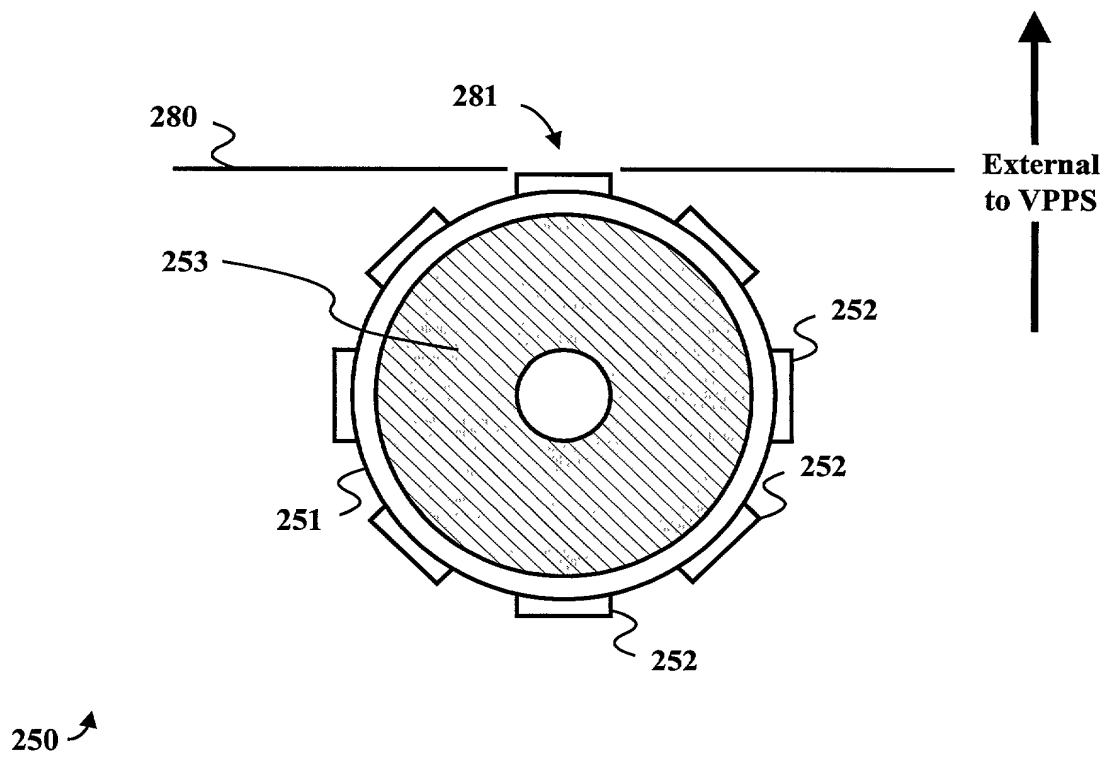


Figure 7A

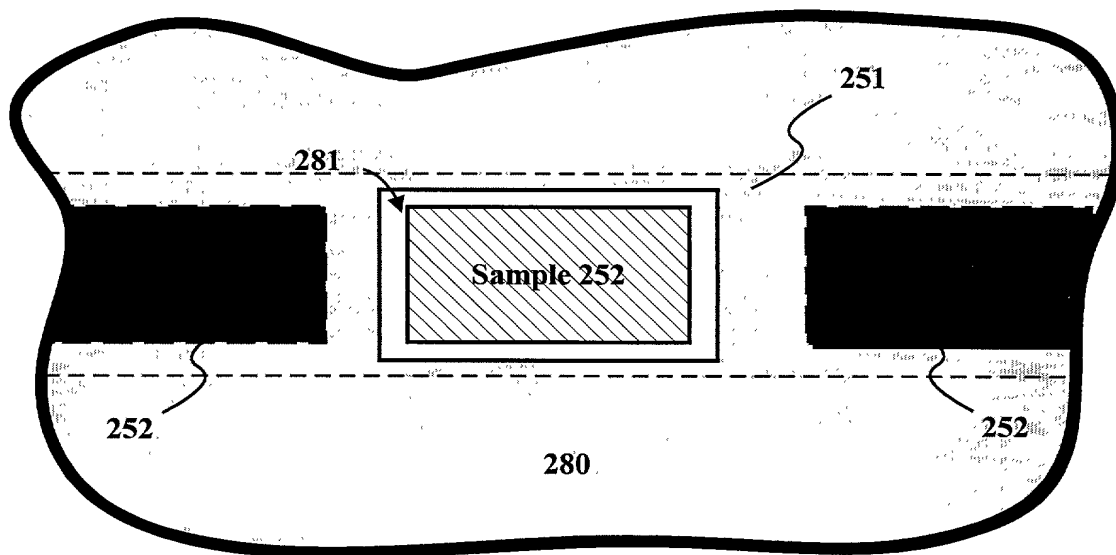
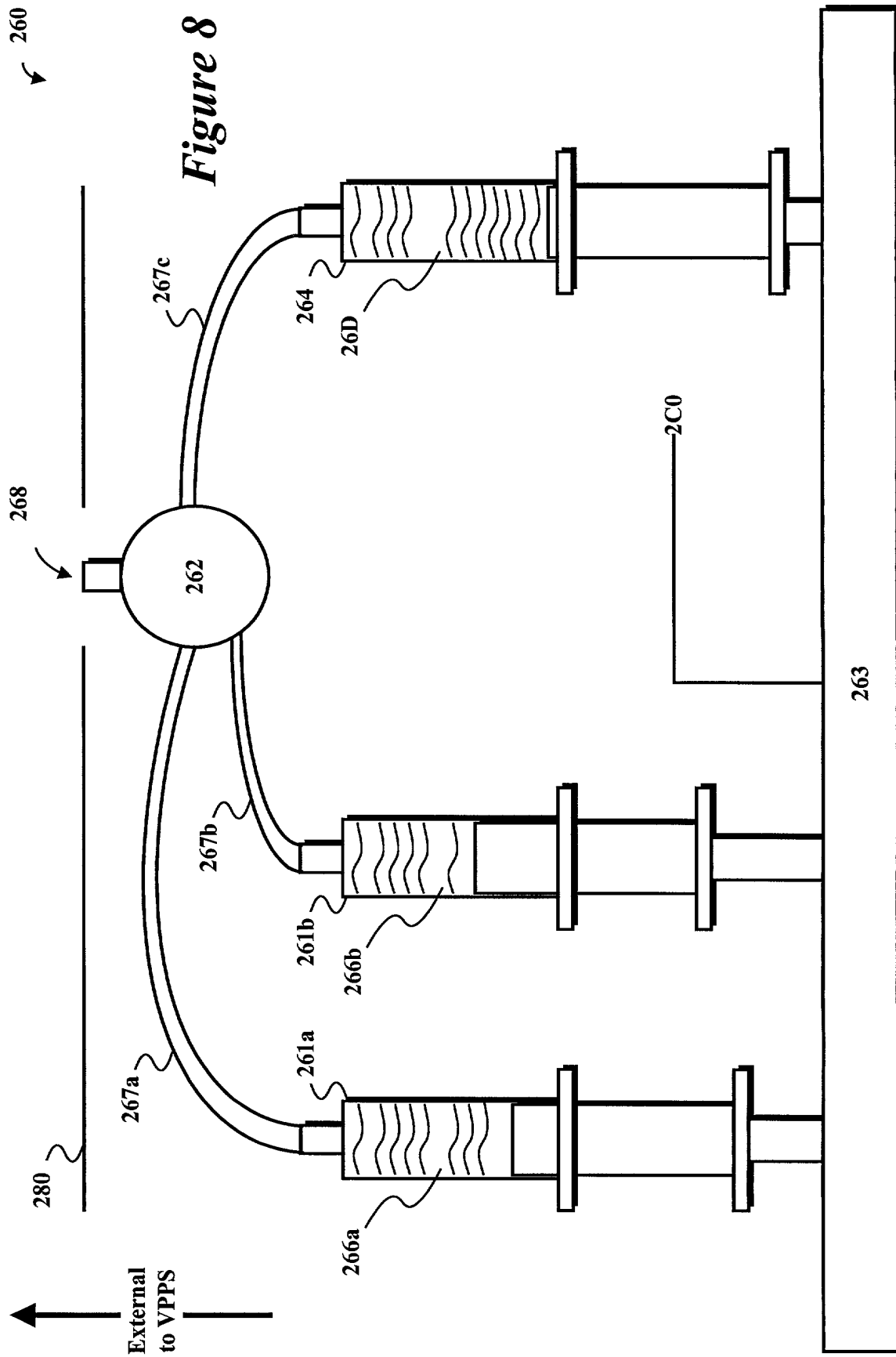


Figure 7B



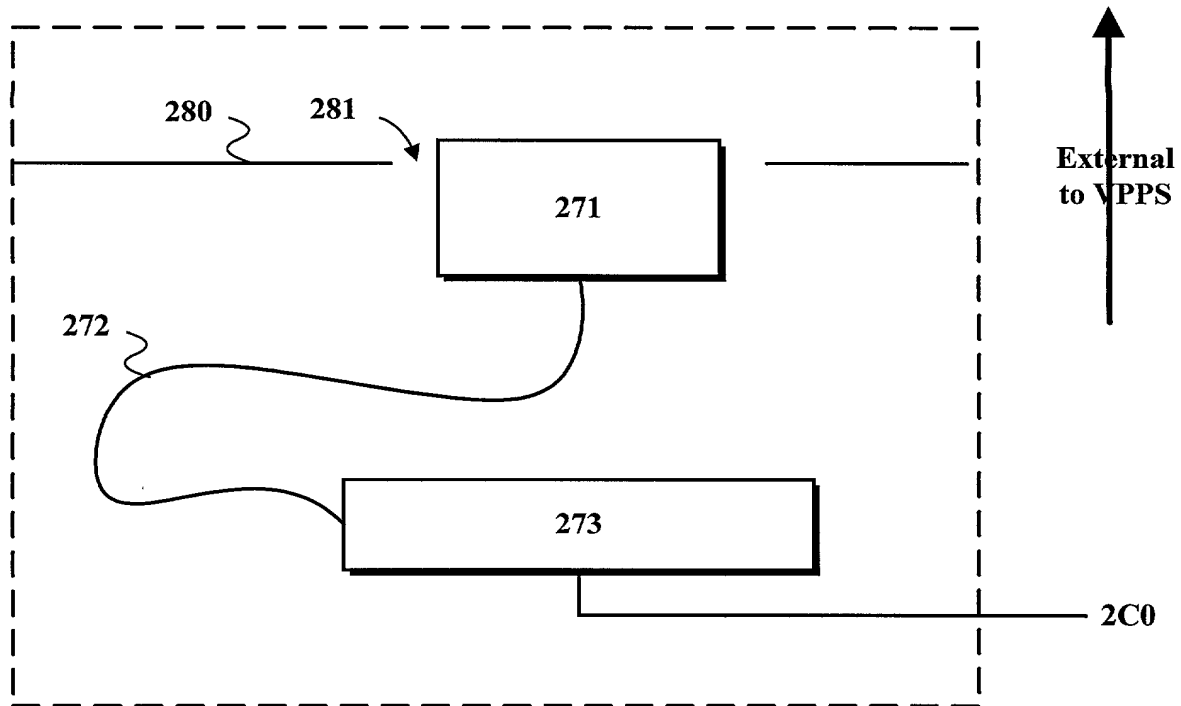


Figure 9

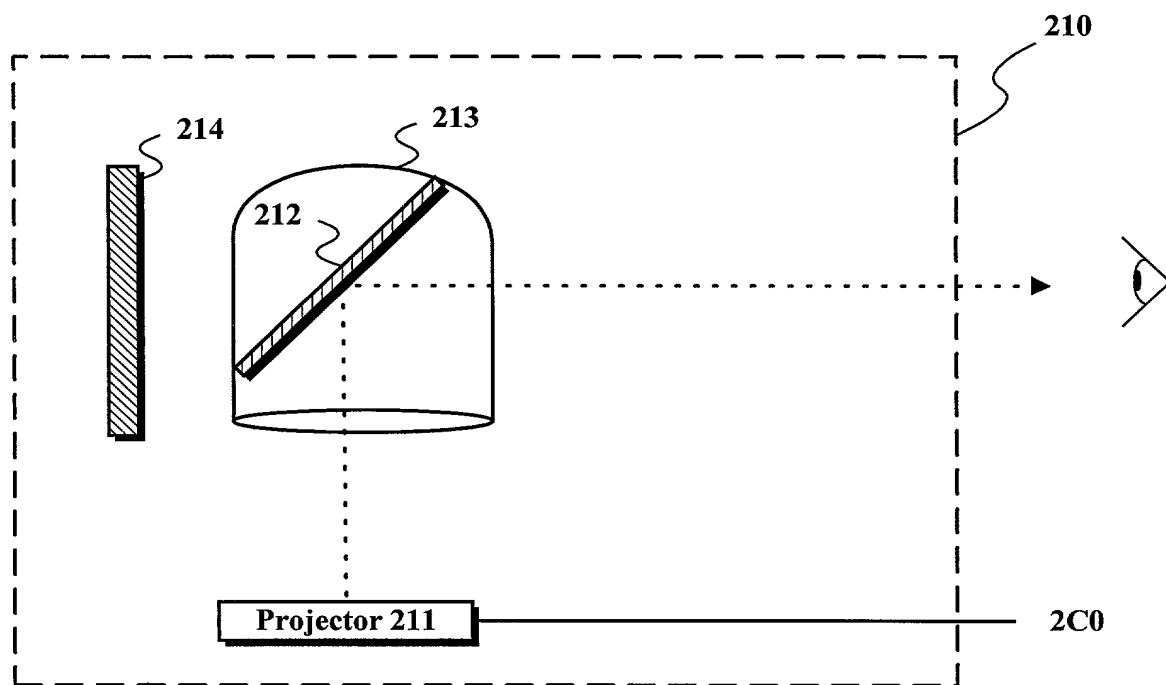


Figure 10

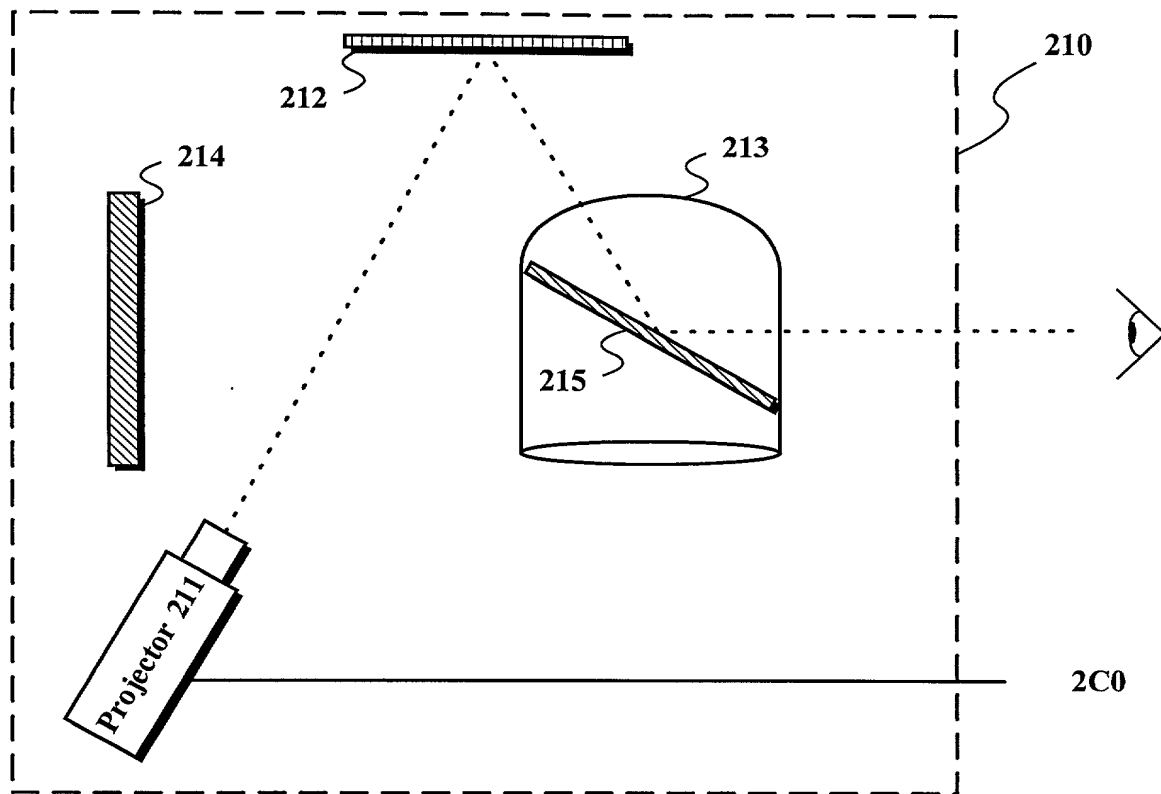


Figure 11

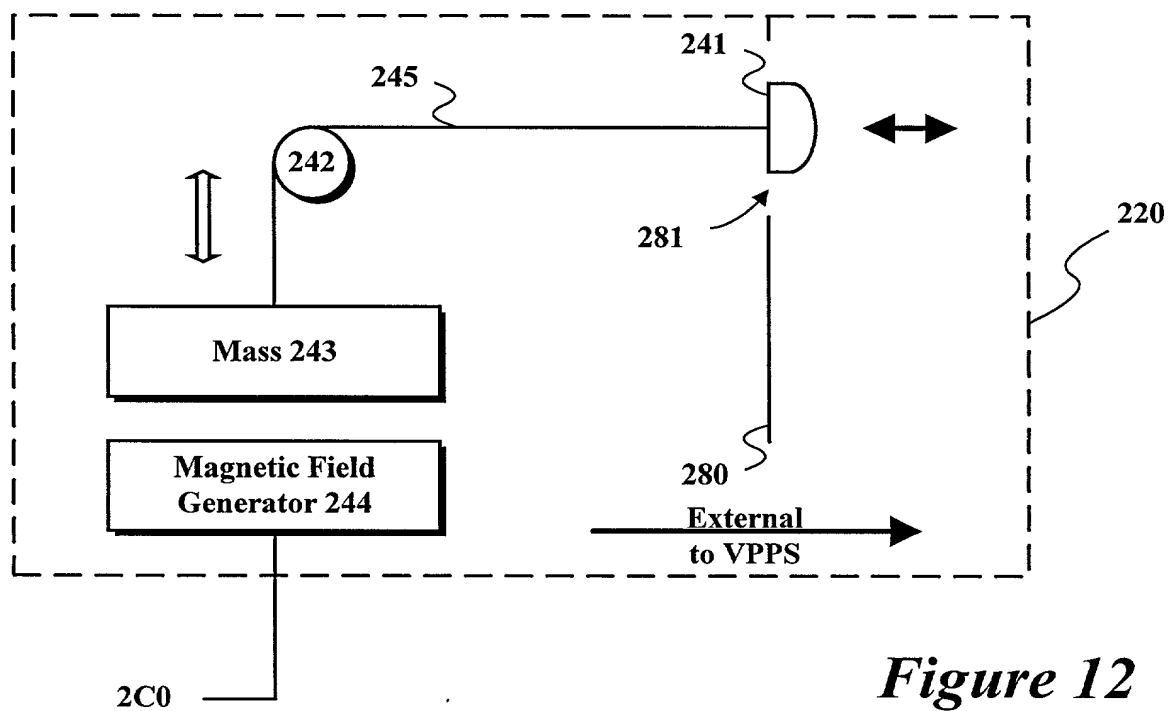


Figure 12

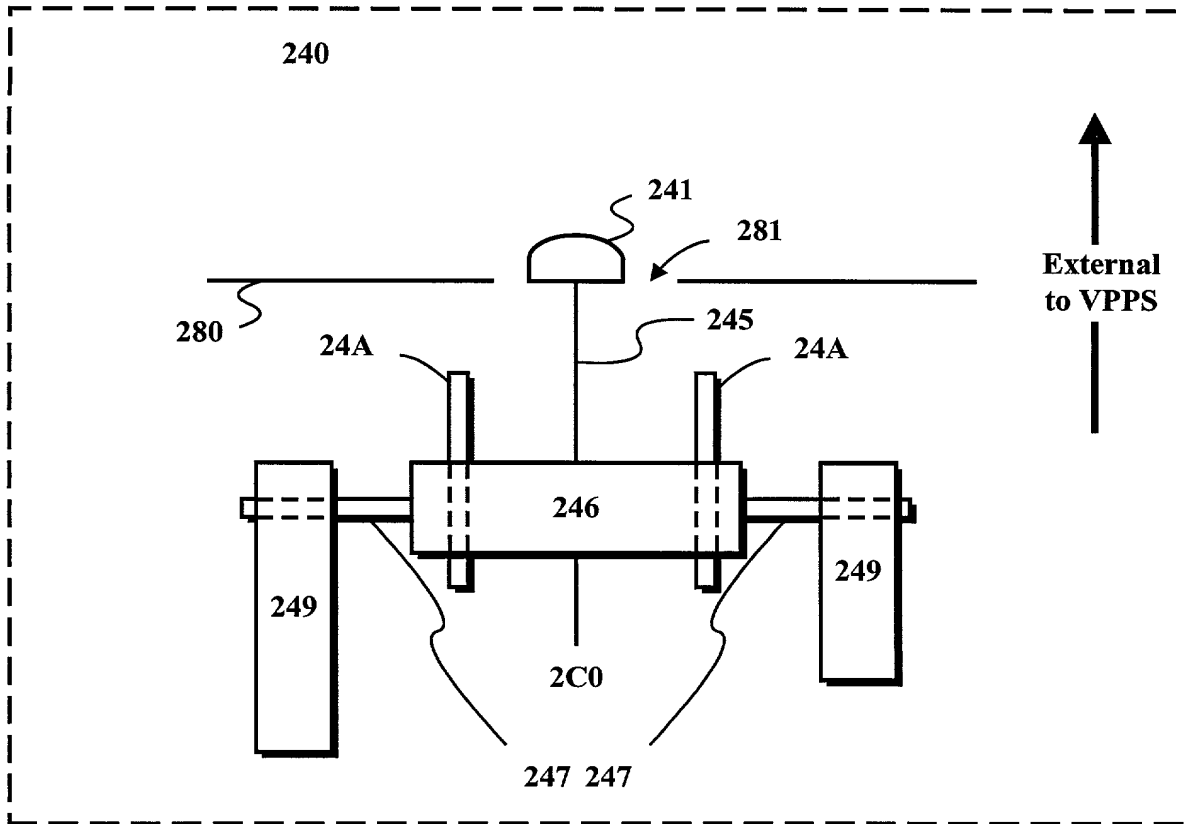


Figure 13

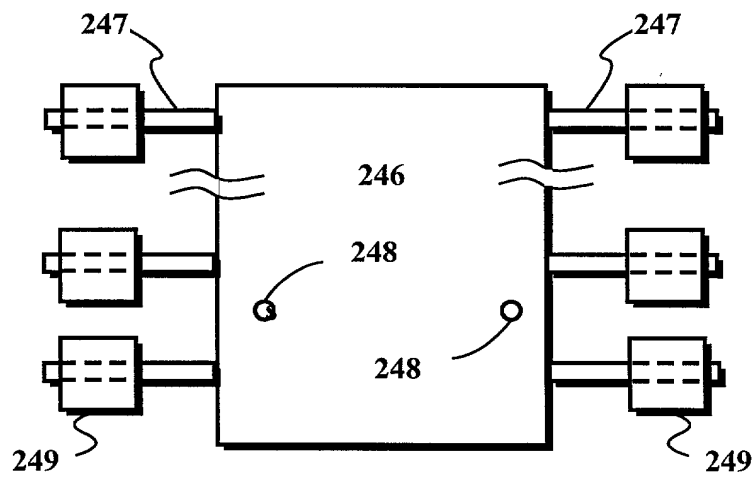


Figure 16

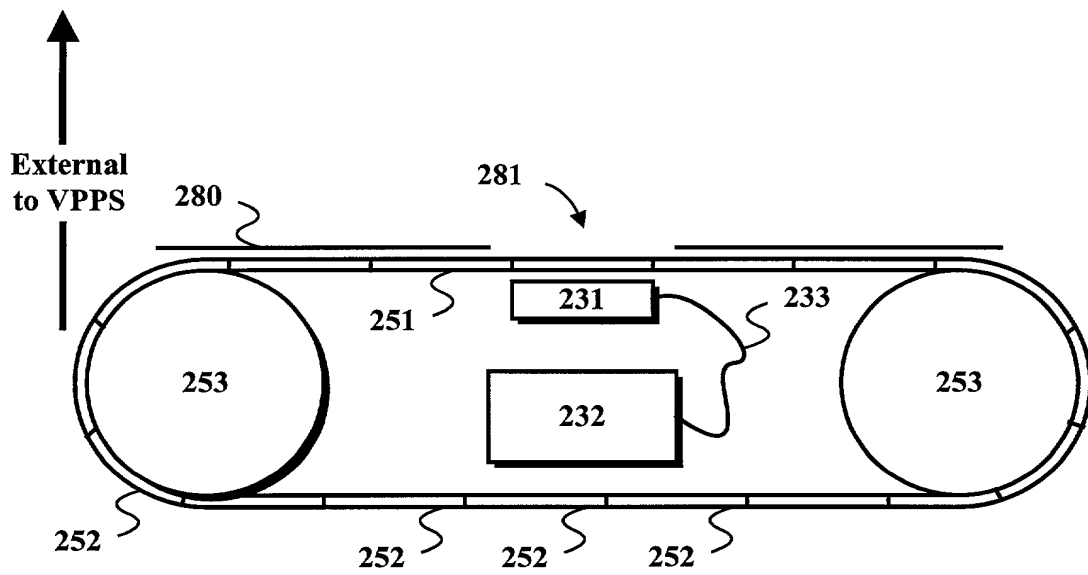


Figure 14

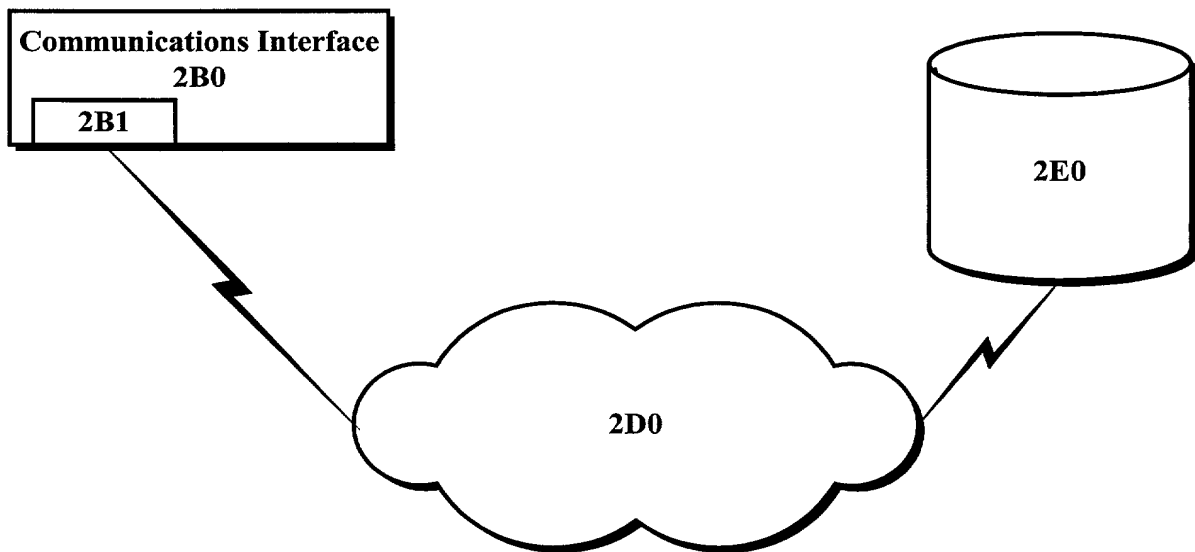


Figure 15

DECLARATION FOR PATENT APPLICATION

As a below-named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled A VIRTUAL-PRODUCT PRESENTATION SYSTEM, the specification of which

(check one)

☒ is attached hereto.

☐ was filed on _____ as
Application Serial No. _____
and was amended on _____.
(if applicable)

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the Patent Office all information known to me to be material to patentability as defined in 37 CFR 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)			Priority Claimed	
_____	_____	_____	<input type="checkbox"/>	<input type="checkbox"/>
(Number)	(Country)	(Day/Month/Year Filed)	Yes	No
_____	_____	_____	<input type="checkbox"/>	<input type="checkbox"/>
(Number)	(Country)	(Day/Month/Year Filed)	Yes	No
_____	_____	_____	<input type="checkbox"/>	<input type="checkbox"/>
(Number)	(Country)	(Day/Month/Year Filed)	Yes	No

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose to the Patent Office all information known to me to be material to patentability as defined in 37 CFR 1.56 which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

_____	_____	_____
(Application Serial No.)	(Filing Date)	(Status)
		(patented, pending, abandoned)
_____	_____	_____
(Application Serial No.)	(Filing Date)	(Status)
		(patented, pending, abandoned)

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San Francisco, California 94111-4187

File No. A-68295/MAK/LM

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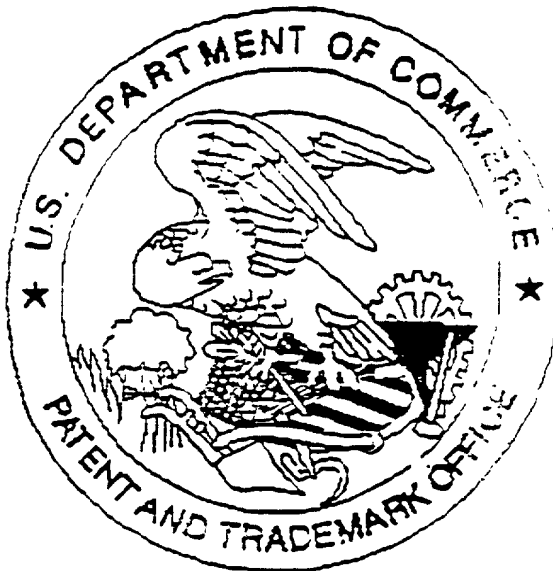
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DECLARATION FOR PATENT APPLICATION

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